Proposal to Delist Los Osos Creek for Priority Organics

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1. Introduction

Total Maximum Daily Loads (TMDLs) are required for water bodies listed as "impaired" pursuant to Section 303(d) of the Clean Water Act. An impaired water body is any known segment that does not meet applicable water quality objectives and/or is not expected to meet applicable water quality objectives, even after the application of technology-based effluent limitations or other Regional Board requirements. Los Osos Creek was placed on California's 1998 303(d) list for Priority Organics. This document reviews the 303(d) listing of Los Osos Creek and recommends that Los Osos Creek be removed from this listing.

a. Background

Los Osos Creek is on the 303(d) list for Priority Organics. This creek drains into the Morro Bay Estuary (see Figure 1), which is a designated National Estuary by the United States Environmental Protection Agency. Regional Board working files indicate that the creek was listed for Priority Organics based on erosion problems the Los Osos Landfill was having in 1991 (Nanson, 2000), however no actual sampling data was collected.

The County of San Luis Obispo owns the Los Osos Landfill and has been monitoring the surface water and groundwater upstream, across from and downstream of the landfill since 1988. Data from the three surface monitoring stations indicate no organic compounds have been detected at levels above any regulatory values since 1997. It should be noted that there were certain organics found above regulatory values before 1997 (dichloromethane, PCE, TCE, and vinyl chloride) (Nanson, 2000); however, these constituents have not reappeared since 1997 (raw data in Appendix 1).

The area surrounding Los Osos Creek is mainly farmland and grazing land. Based on the 1999 California Pesticide Use Report Data, this is an area where a relatively small amount of pesticide or herbicide is applied in comparison to the other hydrologic units of the region. The main chemical, which comprises 87% percent of the application, is sulfur (California Department of Pesticide Regulation, 1999). Nearly all other chemicals applied near Los Osos Creek constitute a fraction of a percent each when compared with the sulfur application.

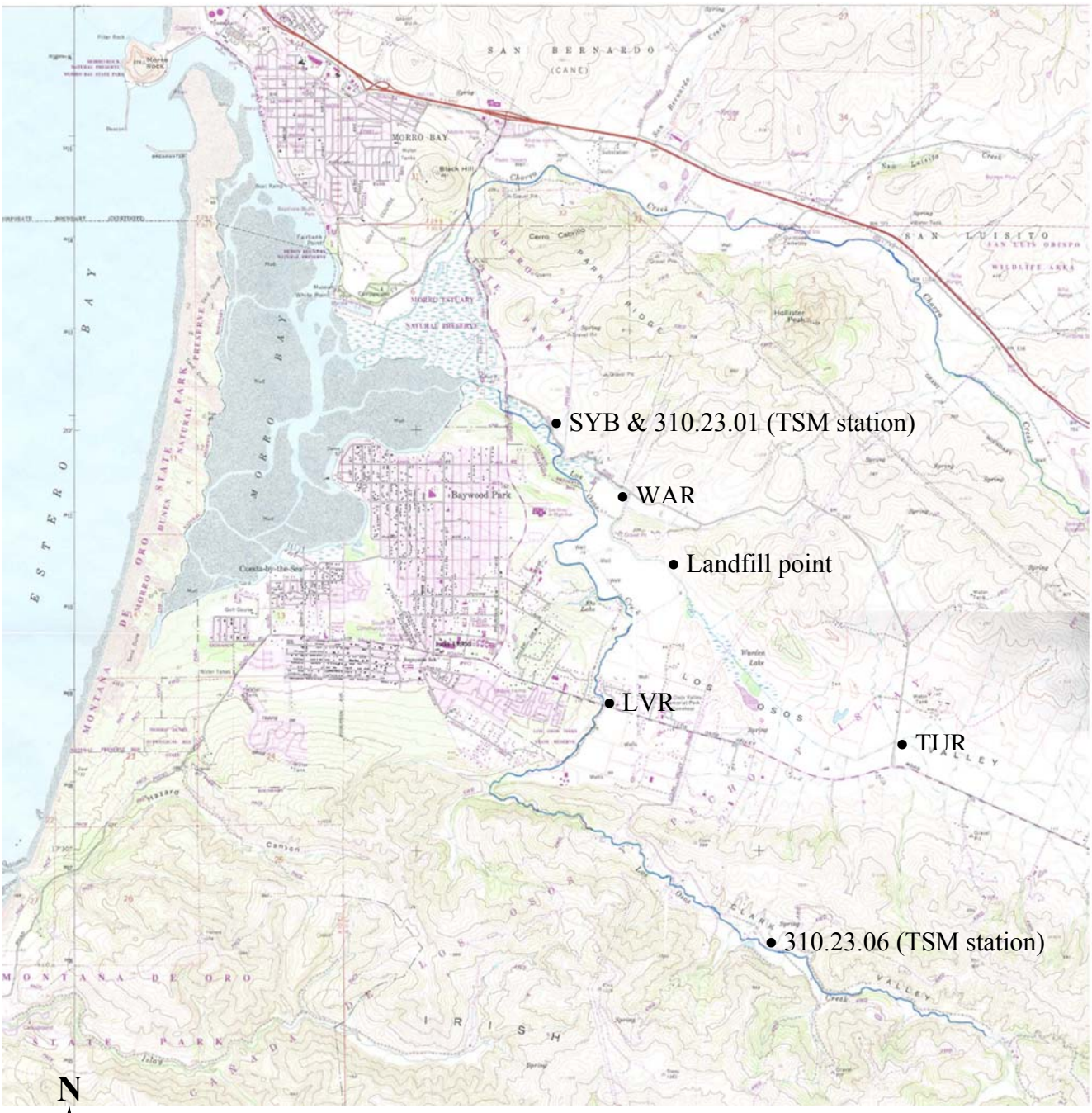
California State Mussel Watch program conducts tissue analysis on shellfish along the coast of California, including Morro Bay. No tissue analyses have been conducted since 1980 in Morro Bay for the presence of organics in mussels (California State Mussel Watch, 1988). This data is too old to be considered relevant to this current listing.

Toxic Substances Monitoring Program (TSM) took two fish samples (California Killifish and Rainbow Trout) from Los Osos Creek in August of 1992 and analyzed them for 45 different pesticides and PCBs. The only organics found in the fish tissue were the DDT derivatives DDE and DDD (Toxic Substances Monitoring Program, 1995). No DDT was detected. The California Killifish was the only sample of the two that had

tissue levels considered harmful to the organism; levels exceeded 9.1 ppb, the standard in the California Ocean Plan (State Water Resources Control Board, 2000), for total DDT level (i.e. DDE plus DDD). Again, like the State Mussel Watch, this data is almost 10 years old and is not necessarily representative of the current situation.

Natural events have occurred that may have significantly changed conditions represented by historical data. For example, during the 1994-95 rainy season, El Niño rains fell and the Creek flowed at record highs. These flows most likely flushed a large part of Los Osos Creek sediment out into the ocean. This rain presumably flushed much of the organics that may have been attached to the sediment, out to sea as well.

Given the above background information, the only reasons to suspect Priority Organics in Los Osos Creek are present and problematic are based on older data regarding the landfill and tissue analyses data that suggest DDE and DDD may have been a problem in 1992. Therefore, Regional Board Staff decided to conduct a monitored assessment to determine if Priority Organics are present in Los Osos Creek and adversely affecting the beneficial uses.



To scale, but because of scanning, scale unknown

Figure 1: Los Osos Creek (lower creek in blue outline) and sampling locations.

b. Monitored Assessment

Two sampling events were conducted. These took place on March 8, 2001 and June 5, 2001. Five samples sites were selected in Los Osos Creek and its tributaries (see Figure 1). Water and sediment samples were taken in all five spots (with the exception of no sediment taken at SYB March 8, because of the vegetated bank and high water level, and neither sediment nor water was taken at LVR June 5 because the creek was dry). Both water and sediment samples were analyzed with EPA methods 8080, 8270, and 8260. The sample collection on March 8 was after a period of very heavy rain and the June 5 collection was after a period of fairly dry weather. Sampling was performed in this manner to account for seasonality. Monitored assessments met the suggested criterion of having a minimum of Level II information according to Clean Water Act, Section 303(d) "Listing Guidelines for California."(1997).

c. Results of the Monitored Assessments

(see Appendix 2 for raw data from these assessments)

1. March 8, 2001-monitored assessment

No organics were found in the water column during this sampling event as all samples came up non-detect. There were, however, detectable readings for certain organics in the sediment. There are no regulatory limits that exist for sediment; but there are screening values that NOAA recommends (NOAA Screening Quick Reference Tables, 1999). The Bay Protection and Toxic Cleanup Program consider any sampling station values higher than ERMs (effects range median) or PELs (probable effects level) to have elevated chemical content (California State Water Resources Control Board, 1998). Therefore, sediment values were compared to ERM and PEL values when applicable. There were no ERMs in NOAA's screening values for any of the constituents found. Bis(2-ethylhexyl)phthalate, DDT, DDD, DDE, endrin and ethyl benzene were found in the sediment below established PEL levels. Bis(2-ethylhexyl)phthalate, DDT, DDD, DDE, and ethyl benzene were found at site-WAR, endrin, DDT, DDD, and DDE were found at site WAR-dup and bis(2-ethylhexyl)phthalate was found at site-TUR. The constituents and their respective NOAA values are broken down by specific chemical later in the document.

2. June 5, 2001-monitored assessment

No organics were found in the water column during this sampling event as all samples came up non-detect. Only one constituent was found in one of the sediment samples. Site-SYB had a detection of methylene chloride in the sediment which was below the agricultural target NOAA has set forth.

d. Sediment – comparing lab given values to NOAA values

Sediment samples were reported to the Regional Board in an "as received basis." That is, the samples were analyzed as they were presented to the lab, and were not dried. NOAA values are reported on a "dry weight basis." Comparing these two sediment values are not equal so a correction factor must be applied. Typical sediment collected creek side normally has a moisture content ranging from 8-20%. Therefore, all

concentrations reported to the Board were converted to dry weight by multiplying the concentrations by 8 and 20% moisture to give us a range of expected values. No values of organics in the sediment were above levels considered harmful by NOAA. Please see Appendix 3 for a description of NOAA values.

2. Problem Statement

The most current data available for Los Osos Creek indicate that numeric water quality objectives for Priority Organic concentrations per the California Toxics Rule and the Basin Plan are being met. Narrative sediment quality standards relating to organics are being met as well according to the Basin Plan. Numeric sediment quality guidance taken from NOAA values implies that no sediment samples exceed an upper threshold which indicates "probable toxic effects." No recent tissue data is available, however, based on the values seen in the sediment and in the water, impairment of tissue is not expected. Because available data indicate both numeric and narrative objectives (of the Basin Plan and the California Toxics Rule) are being achieved in Los Osos Creek, the Creek is identified as having no Priority Organic-specific water quality impairment.

a. Basin Plan Objectives

According to the Basin Plan, there should not be any constituents present in water bodies at levels which compromise any impacts to beneficial uses. Beneficial uses for Los Osos Creek include: municipal and domestic supply, agricultural supply, ground water recharge, water contact recreation, non-contact water recreation, wildlife habitat, cold fresh water habitat, warm fresh water habitat, migration of aquatic organisms, spawning reproduction and early development, rare, threatened or endangered species, freshwater replenishment, commercial and sport fishing (Regional Water Quality Control Board, 1994).

In the Basin Plan's general objectives, it states that, "no individual pesticide or combination of pesticides shall reach concentrations that adversely affect beneficial uses. There shall be no increase in pesticide concentrations found in bottom sediments or aquatic life" (Regional Water Quality Control Board, 1994). Based on sediment data, organics are not present in concentrations that adversely effect beneficial uses when compared with NOAA screening values. Without chemistry background data, it is not possible to say if the concentrations are increasing or decreasing. However, given the biodegradation properties of DDT, it appears as though the DDT is in the process of biodegrading. Based on the tissue data taken in 1992, DDE and DDD were found in one of the two fish samples (California Killifish) at levels above what is considered acceptable according to the California Ocean Plan (State Water Resources Control Board, 2000). Ocean Plan objectives are mentioned in this freshwater creek situation because there are no freshwater tissue regulations that exist. Therefore, ocean water regulations will be used instead. Ocean Plan objectives state that DDT levels in tissue shall not exceed 9.1 parts per billion (ppb). Although there was no DDT found in the fish tissue, DDD and DDE were found (see Table 1). These breakdown products are summed and collectively considered DDT. While the DDT value in Killifish exceeds the regulations, this data was taken in 1992. This data is too old to be considered representative of the current situation. If there were simultaneous sediment samples taken at the time of the fish tissue samples in 1992, we would expect the values of DDT in the sediment to have

been higher than the current concentration of DDT in the sediment. Unfortunately, these samples were not taken. No recent tissue sampling has been done since 1992, but based on the sediment values obtained in the two monitored assessments this year; concentration of DDT in the tissue of fish in 2001 is not expected.

Table 1: DDD and DDE levels found in California Killifish and Rainbow Trout tissue in 1992 on Los Osos Creek.

	Level found (ppb)			Ocean Plan Regulations (ppb)
Site/type of fish	DDD	DDE	DDT - total	DDT - total
310.23.01/ CA Killifish	16	92	108	9.1
310.23.06/Rainbow Trout	None detected	7.2	7.2	9.1

For organic chemicals, the Basin Plan states that "all inland surface waters…shall not contain concentrations of organic chemicals in excess of the limiting concentrations set forth in California Code of Regulations, Title 22, Chapter 15, Article 5.5, Section 64444.5." Since all water column samples came up non-detect, this section is satisfied.

b. Priority Organics – California Toxics Rule, Federal Register, 40 CFR Part 131

Priority Organics, as listed in the Federal Register, give numeric concentrations of constituents that should not be exceeded in water (Federal Register, 2000). Because there were no detections of these constituents in water, there were no violations of these regulations.

c. Organic Constituents Found in the Sediment

1. Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate is a colorless oily liquid that is extensively used in a wide variety of industrial, domestic and medical products and is ubiquitous in the environment (Risk Assessment Information System, 2001). Research has shown bis(2-ethylhexyl)phthalate binds onto dissolved organic macromolecules and that in most soil-water systems, these macromolecules are not mobile. These macromolecules tend to be extensively adsorbed onto soil surfaces due to a large part to van der Waals forces (Dragun, 1988). Therefore, bis(2-ethylhexyl)phthalate is not expected to enter the water column.

There are no known sources of this chemical that could be rectified on Los Osos Creek. The presence of this chemical may be due to its presence in the environment and the atmosphere. In terms of affecting aquatic life, experiments have shown that fish do not extensively bioaccumulate this chemical, however, it may cause symptoms in the liver and kidney's of laboratory rats (Risk Assessment Information System, 2001). Data regarding toxicity in humans was not available. Concentrations of bis(2-ethylhexyl)phthalate were below NOAA guidance values. Table 2 contains actual data regarding bis(2-ethylhexyl)phthalate and comparisons to NOAA values.

Table 2: Levels of **bis(2-ethylhexyl)phthalate** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration, corrected to account for a "dry weight basis"		NOAA value based on a "dry weight basis"
Site		Assuming 8% moisture	Assuming 20% moisture	UET
WAR	0.069	0.07452	0.0828	0.750
WAR-dup	0.16	0.1728	0.192	0.750
TUR	0.069	0.07452	0.0828	0.750

2. DDT and metabolites

DDT is an organochlorine that was used as an insecticide and has been banned for use in the United States since 1972 (Extension Toxicology Network Pesticide Information, 2001). DDT, like bis(2-ethylhexyl)phthalate, binds onto dissolved organic macromolecules and is generally not mobile. DDT tends to be extensively adsorbed onto soil surfaces due to a large part to van der Waals forces. DDT is nearly a planar configuration and the larger the planar surface area is, the greater the extent of adsorption (Dragun, 1988).

DDE is a metabolite of DDT (see Figure 2). Because the DDT values found in the sediment are lower than DDE values, we can infer that DDT is in the process of biodegrading. The biodegradation process of DDT can take decades.

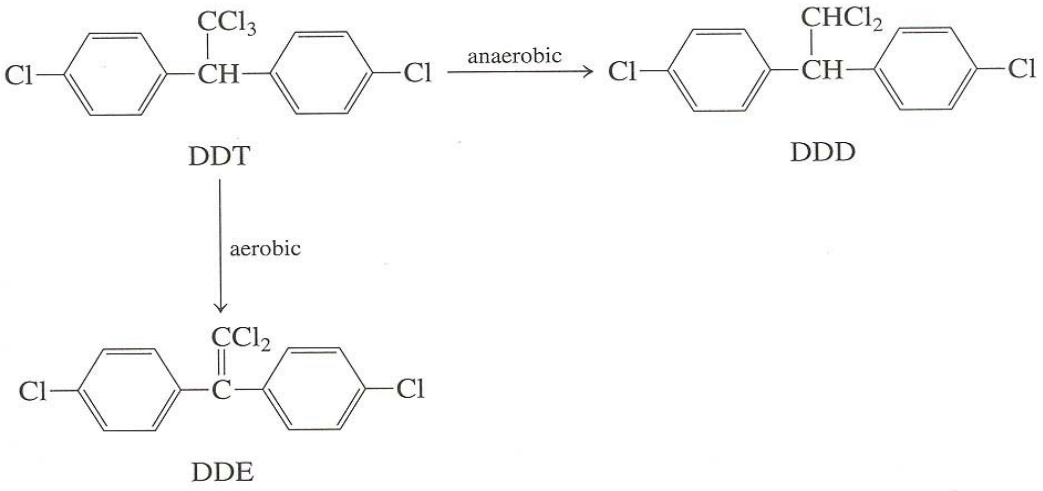


Figure 2: Biodegradation pathways of DDT (Watts, 1998).

Because this chemical was banned back in the 1970's, there is no reason to suspect any new DDT would be entering the environment. There are residual amounts of DDT that remain in the soil (see Tables 3-5) at levels that are not expected to be harmful to any of the beneficial uses of the creek, according to NOAA guidance values.

In terms of the DDD and DDE found in the tissue of the California Killifish, we do not expect to see these types of levels at this point in time. If, for the sake of argument, levels were higher than expected, preventative action would entail controlling erosion on the creek banks, which is already being proposed through the Siltation TMDL

for Chorro Creek, Los Osos Creek and the Morro Bay Estuary (Regional Water Quality Control Board, 2001). Therefore, any and all best management practices that may be put into effect in a worse case scenario are already in progress.

Table 3: Levels of **DDD** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR	0.00063	0.00068	0.00076	0.00851	0.060
WAR-dup	0.00046	0.00050	0.00055	0.00851	0.060

Table 4: Levels of **DDE** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR	0.0044	0.00475	0.00528	0.00675	0.050
WAR-dup	0.0041	0.00443	0.00492	0.00675	0.050

Table 5: Levels of **DDT** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR	0.0036	0.00389	0.00432	no value	0.050
WAR-dup	0.0031	0.00335	0.00372	no value	0.050

3. Endrin

Endrin is a solid, white, nearly odorless substance that was mainly used on field crops and also used to control rodents and birds. Endrin has not been produced or sold for general use in the U. S. since 1986. This substance does not dissolve well in water and tends to cling to the bottom sediments of water bodies (Environmental Media Services, 2001). As with DDT, there is no reason to suspect that any more endrin will be entering the environment. No endrin was found in fish tissue samples taken by Toxic Substances Monitoring Program (Toxic Substances Monitoring Program, 1995). No values endrin concentrations exceeded NOAA guidance values. Please see Table 6 for the actual data regarding endrin.

Table 6: Levels of **endrin** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration corrected to account for a "dry weight basis"		NOAA values based on a "dry weight basis"	
Site		Assuming 8% moisture	Assuming 20% moisture	PEL	UET
WAR-dup	0.0006	0.00065	0.00072	0.0624	0.5

4. Ethyl benzene

Ethyl benzene is a colorless organic liquid with a sweet, gasoline-like odor. It is found in most common household products such as pesticides, carpet glues, varnishes, paints, and in gasoline (College Term Papers, 2001). There are many ways this constituent could have entered the creek at some point in time but it does not appear that there exists a continuous source of ethyl benzene that could be controlled. There was no concentration of ethyl benzene that exceeded NOAA guidance values. Please see Table 7 for actual data regarding ethyl benzene.

Table 7: Levels of **ethyl benzene** found in the sediment compared with NOAA values per the March 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration, corrected to account for a "dry weight basis"		NOAA value based on a "dry weight basis"
Site		Assuming 8% moisture	Assuming 20% moisture	AET for marine sediment*
WAR	0.0027	0.00292	0.00324	0.004

*No values given for freshwater sediment.

5. Methylene Chloride

Methylene chloride is a colorless liquid with a sweetish odor. It is predominantly used as a solvent in paint strippers and removers; as a process solvent in the manufacture of drugs and pharmaceutical and film coatings; as a metal cleaning and finishing solvent in electronics manufacturing; as a propellant in aerosols for products such as paints, automotive products and insect sprays; and as a post-harvest fumigants for grains and strawberries and as a degreening agent for citrus fruit (Lakes Environmental Software, 2001). Because there are so many different uses of this constituent, its origin cannot be conclusively determined. While there are strawberry farms in the vicinity of Los Osos Creek, according to the 1999 California Pesticide Database, this chemical was not applied (California Department of Pesticide Regulation, 1999). The detection of methylene chloride was well below levels considered harmful by NOAA values. Please see Table 7 for actual data.

Table 7: Levels of **methylene chloride** found in the sediment compared with NOAA values per the June 5, 2001 sampling. All concentrations are in **mg/kg**.

	Concentration on an "as received basis"	Concentration, corrected to account for a "dry weight basis"		NOAA value based on a "dry weight basis"
Site		Assuming 8% moisture	Assuming 20% moisture	Agricultural target
SYB	0.030	0.03240	0.03600	0.100

3. Rationale To Delist

Regional Board staff considered delisting factors identified in the 1998 Clean Water Act Section 303(d) Listing Guidelines for California (Ad Hoc Workgroup, 1997) for adding or removing waterways from the 303(d) list. These guidelines were developed by a workgroup of regional board, state board, and US EPA Region 9 staff and indicate that water bodies may be delisted for specific pollutants or stressors if any one of six factors is met. These guidelines were considered by the Central Coast Regional Board, State Water Resources Control Board, and US EPA Region 9 during the public and administrative review and approval of the State's 303(d) List of Impaired Waters in 1998. Two out of the six of these specific delisting factors may be applied to this situation.

The six Delisting Factors were:

1. Objectives are revised, and the exceedance is thereby eliminated.
2. A beneficial use is de-designated after US EPA approval of a Use Attainability Analysis, and the non-support issue is thereby eliminated.
3. Faulty data led to the initial listing. Faulty data include, but are not limited to typographical errors, improper quality assurance/quality control (QA/QC) procedures, or Toxic Substances Monitoring/State Mussel Watch EDLs which are not confirmed by risk assessment for human consumption.
4. It has been documented that the objectives are being met and beneficial uses are not impaired based on "Monitored Assessment" criteria.
5. A TMDL has been approved by the US EPA.
6. There are control measures in place which will result in protection of beneficial uses. Control measures include permits, cleanup and abatement orders, and watershed management plans which are enforceable and include a time schedule.

The fourth delisting factor states that a water body may be delisted for a specific pollutant if "it has been documented that the objectives are being met and beneficial uses are not impaired based upon 'Monitored Assessment' Criteria." Based on the Monitored Assessments that took place on March 8 and June 5 of 2001, objectives are being met and beneficial uses are not impaired. In both dry and wet weather, Priority Organics were not found in the water column and the Priority Organics found in the sediment were at levels that would not be expected to be harmful to any of the beneficial uses of the creek, according to NOAA guidance values. Although DDE and DDE were found in the tissue of fish in 1992, these chemicals are breakdown products of DDT and should be decreasing in concentration with time. Nine years later, we expect fish tissue levels to be

negligible. If it were determined there was still a problem with levels of DDT in the tissue of fish; the course of action would be to control erosion, which is already proposed by the Siltation TMDL for Chorro Creek, Los Osos Creek and the Morro Bay Estuary.

The sixth delisting factor states that a water body may be delisted for a specific pollutant if "there are control measures in place which will result in protection of beneficial uses. Control measures include permits, clean up and abatement orders, and watershed management plans, which are enforceable and include a time schedule." There are two such "control measures" in place on Los Osos Creek and its tributaries.

The first of these has to do with the Los Osos Landfill. The landfill was issued several clean up and abatement orders (CAO) beginning in 1989. According to Chapter 15 regulations, the discharger must continue a Corrective Action Program for as long as is necessary to bring the affected waters into compliance with water quality standards (California Code of Regulation, 1984). To this date, the County of San Luis Obispo continues to monitor upstream, across from and downstream of the landfill. The CAO has not yet been rescinded because the County has been finding organics in the groundwater monitoring wells. However, as stated earlier, there has been no detection of any organics in the surface water since 1997.

The second of the two control measures is the Siltation TMDL for Chorro Creek, Los Osos Creek and the Morro Bay Estuary. Because erosion of farmlands is the only expected source of legacy pollutants into the creek, controlling of the sediment should stop these pollutants from entering, if there are any left. This TMDL assures that excess sediment will not enter the creek. There are several ways that this will be implemented. One of the ways is that the growers in the area must attend a short course on how to best manage their lands to control erosion (along with other issues). These growers have been monitoring their lands voluntarily and reporting results to the Farm Bureau. Joy Fitzhugh of the Farm Bureau visits the farmers in the field to check up on the progress they are making. The growers send reports of this progress to the Regional Water Quality Control Board. Additionally, the National Monitoring Program does monitoring to determine the effectiveness of the new Best Management Practices these growers are putting into action.

In addition to reasons four and six listed above, Los Osos Creek will be in the Central Coast Ambient Monitoring Program's (CCAMP) rotation in the calendar year 2002 (Worcester, 2001). There will be a point selected on the Creek and monthly monitoring will take place. A wide variety of tests will be conducted, among them an organic toxicity or tissue test, if it is deemed necessary. CCAMP's monitoring is important because this Creek will continue to be monitored.

Regional Board Staff recommend delisting Los Osos Creek for Priority Organics. Based on NOAA screening values and existing control measures we do not expect the impairment of any of the beneficial uses of Los Osos Creek.

4. Public Participation

This proposal to delist Los Osos Creek for organics will be presented to the Central Coast Regional Board for approval in a public meeting. Board meeting agendas are publicly noticed in advance and include opportunity for public comment on all action items before the Board. Prior to presentation to the Regional Board, a preliminary draft of the proposal will be sent out to the Interested Parties List developed for the Morro Bay

and Chorro Creek Siltation TMDL. The mailout will include a schedule indicating when the formal draft proposal for public comment is anticipated and that the proposed delisting is scheduled as part of the 303(d) list update scheduled for presentation to the Regional Board at its October 2001 meeting. In addition to the mailout of the draft proposal to delist, a meeting will be scheduled with the National Estuary Program implementation committees to present these findings and enhance stakeholder input to the process.

If the Regional Board approves the proposal, it will be submitted to the State Board staff for inclusion in the state's public process of updating California's 303(d) list in 2001. These overlapping regional and state efforts will afford ample opportunity for public input on the Regional Board staff proposal to remove Los Osos Creek from California's 303(d) listing of organics-impaired waters.

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Appendix 1 – Raw Data, County Landfill

Appendix 2 – Monitored Assessments, Raw Data

Appendix 3- Description of NOAA values

Explanation of NOAA Screening Values

PEL = The level above which adverse effects are frequently expected.
ERM = The median concentration of the toxic effects data set and the median of no effect data set.
AET = Represents concentration above which biological impacts would always be expected by the specific biological indicator due to exposure to the particular contaminant alone (toxic effects may also be observed below these levels).